

REMARKS

Claims 1 and 4-19 remain herein.

Independent claim 1 recites an apparatus for applying ultrasonic vibration to a resin material which applies the ultrasonic vibration to the resin material in a molten state, the apparatus including: a vibrator which applies ultrasonic vibration to a resin material, or a vibration transmission member which transmits vibration of the vibrator to a resin material, wherein the vibrator or the vibration transmission member has high adhesive properties to the resin material, the vibrator or the vibration transmission member is located in a channel of a flowing molten resin material in contact with the resin material, and the vibrator or the vibration transmission member is positioned to transmit vibration in a direction perpendicular to a flow direction of the flowing molten resin material; and vibration transmission inhibition means is positioned to substantially inhibit members other than the resin material from being vibrated by the vibration of the vibrator or the vibration transmission member.

1. Claims 1, 4, 7, 8 and 12-18 were rejected under 35 U.S.C. § 103(a) over Isayev et al. U.S. Patent 5,284,625 in view of Archer et al. U.S. Patent 6,656,541.

As acknowledged in the Office Action Isayev does not disclose an apparatus wherein the vibrator or the vibration transmission member has high adhesive properties to the resin material. Archer does not disclose what is missing from Isayev. Archer says nothing about a vibrator or the vibration transmission member having high adhesive properties to the resin material. The Office Action states that Archer teaches a titanium ultrasonic tip and that titanium is identified in

applicants' specification to have an affinity for resin materials.

Contrary to the assertion in the Office Action, applicants' specification does not state that titanium has high adhesive properties to any resin material but to resin materials containing carboxylic anhydride or a resin modified by the anhydride:

Therefore, a material of the horn 32 having good adhesive properties to the resin material in a molten state is selected as long as the material has a necessary durability against the ultrasonic vibration, and a transmission loss of vibration is small. **When the resin material contains carboxylic anhydride or a resin modified by the anhydride,** examples of the horn material having good adhesive properties may include duralumin, titanium, stainless steel, steel materials such as carbon steel and alloy steel, soft iron and the like.

Specification, page 18, lines 21-30 (emphasis added here).

In addition, applicants' specification identifies other ways to enhance the adhesive properties of the vibrator or the vibration transmission to the resin material:

Moreover, in a case where there is not any material having good resin adhesive properties in the materials usable as the horn material, the end surface of the horn 32 may also be plated with the material having the good resin adhesive properties, or a metal having good adhesive properties is molten, allowed to collide with the horn 32 at a high speed, and flame-sprayed to modify the properties of the surface of the metal constituting the horn 32. As the metal to be plated or flame-sprayed, a material having high adhesive properties to the resin material may be selected. It is to be noted that polishing of the surface performed after the flame-spraying or plating may be adjusted to leave a concave/convex portion, and the adhesive properties of the resin material may also be further enhanced.

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Moreover, to improve the adhesive properties of the horn 32 to the resin material, a micro concave/convex portion may be formed in the end surface of the horn 32 by sand blasting or etching, or a groove may also be formed by machining or laser processing. An adhesive properties improver for improving the adhesive properties may also be used. The adhesive properties improver differs with types or properties of the resin materials, but examples of a general polymer or a copolymer include maleic anhydride and compositions of maleic acid.

Specification, page 19, line 1 to page 20, line 4.

Archer says nothing about modifying the resin material or the ultrasonic tip to enhance the adhesive properties of titanium towards the resin material. This property is not obvious but achieves improved physical and molding properties of resin materials:

When the adhesive properties to the resin material are high, the resin is allowed to follow the vibration of the vibrating member or the vibration transmission member, the cavitation or pressure vibration by the ultrasonic can be effectively caused inside the resin material, and an effect by the present invention can further be enhanced.

Specification, page 6, line 28 to page 7, line 4.

Adhesive properties between the horn 32 and the resin material in the molten state are preferably high. When the adhesive properties are low, physical properties and the like of the resin material cannot be enhanced. It is presumed that the resin material does not follow the vibration of the horn 32 and the cavitation or pressure vibration by the ultrasonic does not effectively occur.

Specification, page 18, lines 13-20.

Furthermore, the means and effects used by Archer are distinguishable from those of the present invention. Archer applies high frequency vibration to achieve full penetration, a reduced viscosity, and de-gassing (see Archer, column 2, lines 48-56). The presently claimed invention on the other hand uses adhesive properties between the vibrating member or the vibration transmission member and the resin material to achieve improved mechanical properties of the resin material.

Thus, neither Isayev nor Archer discloses all elements of applicants' claims.

Furthermore, Isayev and Archer disclose nothing that would have suggested applicants' claimed invention to one of ordinary skill in the art. There is no disclosure or teaching in Isayev, Archer, or otherwise in this record, that would have suggested the desirability of modifying any portions thereof effectively to anticipate or suggest applicants' presently claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

2. Claims 1, 4, 5, 7, 12 and 15-18 were rejected under 35 U.S.C. § 103(a) over Allan et al. U.S. Patent Publication 2006/0165832 in view of Archer.

As acknowledged in the Office Action, Allan does not disclose an apparatus wherein the vibrator or the vibration transmission member has high adhesive properties to the resin material.

As discussed above, Archer does not teach or suggest this missing claim element.

Thus, neither Allan nor Archer discloses all elements of applicants' claims. Furthermore, Allan and Archer disclose nothing that would have suggested applicants' claimed invention to one of ordinary skill in the art. There is no disclosure or teaching in Allan, Archer, or otherwise in this record, that would have suggested the desirability of modifying any portions thereof effectively to anticipate or suggest applicants' presently claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

5. Claim 6 was rejected under 35 U.S.C. § 103(a) over Isayev or Allan in view of Archer.

As discussed above, neither Isayev nor Allan discloses all elements of applicants' claims. Specifically, neither Isayev nor Allan discloses an apparatus wherein the vibrator or the vibration transmission member has high adhesive properties to the resin material. As discussed above, Archer does not teach or suggest this missing claim element.

Thus, none of Isayev, Allan, or Archer discloses all elements of applicants' claims. Furthermore, Isayev, Allan, and Archer disclose nothing that would have suggested applicants' claimed invention to one of ordinary skill in the art. There is no disclosure or teaching in Isayev,

Allan, Archer, or otherwise in this record, that would have suggested the desirability of modifying any portions thereof effectively to anticipate or suggest applicants' presently claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

6. Claims 9-11 were rejected under 35 U.S.C. § 103(a) over Isayev or Allan, in view of Archer and Rice U.S. Patent 5,269,860.

As discussed above, none of Isayev, Allan, or Archer discloses all elements of applicants' claims. None of Isayev, Allan, or Archer discloses an apparatus wherein the vibrator or the vibration transmission member has high adhesive properties to the resin material.

Rice does not disclose what is missing from Isayev, Allan, or Archer. Rice does not disclose or suggest a vibrator or a vibration transmission member having high adhesive properties to the resin material. Rice is concerned with ultrasonic welding, not with improving the mechanical properties of a resin material. Rice explains that ultrasonic energy is easily transmitted through amorphous resins (see Rice, column 2, lines 64-67), but there is nothing in Rice suggesting the use of a vibrator or a vibration transmission member having high adhesive properties to a resin material. In Rice, the amorphous resin is bonded to another material, but the vibrator itself does not and is not modified to have high adhesive properties to the resin material.

None of Isayev, Allan, Archer, or Rice discloses all elements of applicants' claims. Furthermore, Isayev, Allan, Archer and Rice disclose nothing that would have suggested applicants' claimed invention to one of ordinary skill in the art. There is no disclosure in Isayev, Allan, Archer, Rice, or otherwise in this record, that would have suggested the desirability of modifying any portions thereof effectively to anticipate or suggest applicants' presently claimed

invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

7. Claim 19 was rejected under 35 U.S.C. § 103(a) over Isayev or Allan in view of Archer. Claim 19 depends from claim 18, which depends from independent claim 1.

As discussed above, none of Isayev, Allan or Archer discloses all elements of applicants' claim 1. Furthermore, Isayev, Allan, and Archer disclose nothing that would have suggested applicants' claimed invention to one of ordinary skill in the art. There is no disclosure or teaching in Isayev, Allan, Archer, or otherwise in this record, that would have suggested the desirability of modifying any portions thereof effectively to anticipate or suggest applicants' presently claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

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Accordingly, this application is now fully in condition for allowance and a notice to that effect is respectfully requested. The PTO is hereby authorized to charge/credit any fee deficiencies or overpayments to Deposit Account No. 19-4293 (Order No. 28955.1062). If further amendments would place this application in even better condition for issue, the Examiner is invited to call applicants' undersigned attorney at the number listed below.

Respectfully submitted,

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